Chapter 4
Study Area Growth Predictions

This chapter forecasts the 2040 population and employment characteristics of the Study Area and begins to describe the backdrop and vision for the Study Area future.

The Study Area is growing rapidly and with this growth brings changes and challenges to the transportation system in Davis and Weber counties that this study addressed.

In order to plan for a transportation network that will accommodate future population growth, a careful examination of projected socio-economic conditions occurred. This section provides a summary of existing population, dwelling units and employment in the Study Area as well as for planning year 2040.

Data Collection to Ensure Accurate Population Forecasting

Socio-economic Data

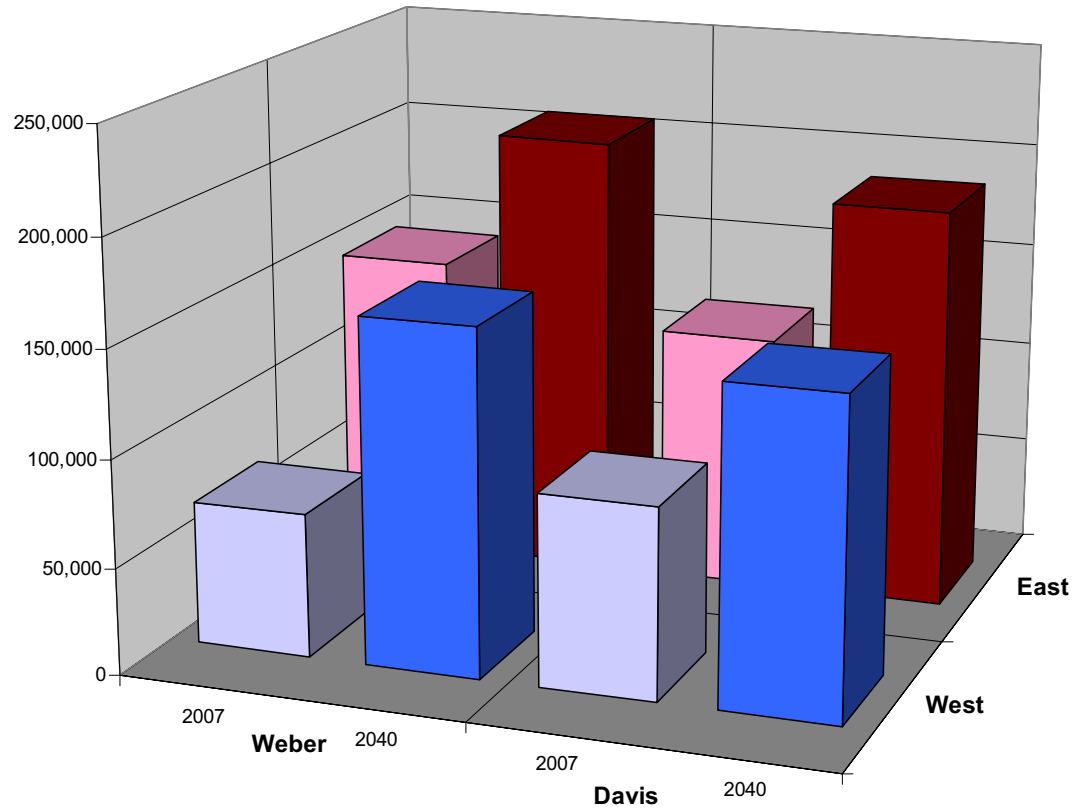
Consultant team members from InterPlan met with representatives from jurisdictions within the Study Area to determine if existing and expected growth is adequately reflected in the Wasatch Front Regional Council (WFRC) travel demand model.

Congestion increases as growth occurs.

Population

As with the non-study areas of Davis and Weber counties and the state as a whole, population projections for the Study Area show steady growth in the coming decades. The existing and future population is shown for the east and west portions of the Study Area in Figure 4. It should be emphasized that jurisdiction level projections included in this analysis are based on an aggregate of traffic analysis zones (TAZs), as used in the travel demand model, and do not necessarily match exact city or county figures.

Figure 4: Population Growth 2007 and 2040, by east and west portions of the Study Area



Davis County's growth rate levels off in the year 2020, most likely due to build out of available land. Between the 1990 and 2000 US Census, Davis County grew by 27 percent or by 51,053 individuals. Weber County grew at a slightly slower pace during the same period of time; 24 percent or 38,203 individuals. Between the April 1, 2000 US Census and Utah's Population Estimates by County for 2006, Davis County has already experienced a 19 percent increase in their population and Weber County a nine percent increase. The population increases dramatically in the western portion of the northwest quadrant of Davis County. Western Weber County experiences strong growth as well. The population expands from Ogden and moves south and west. The impact of this growth on the transportation network will be significant.

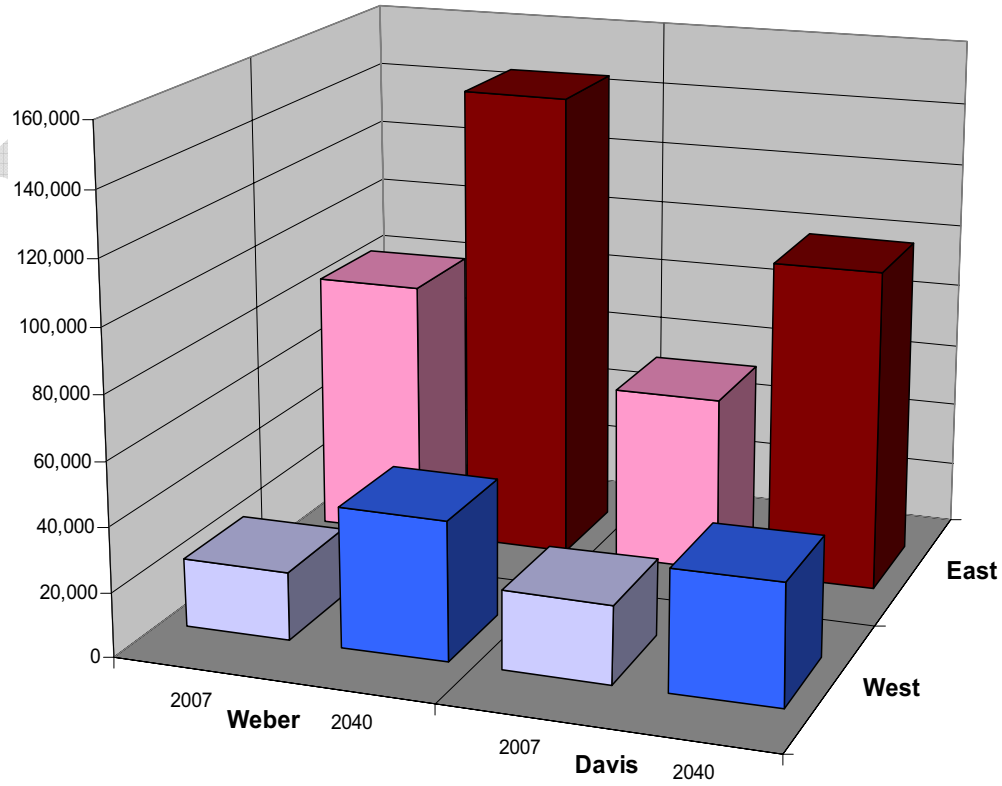
A strong example of growth in the Study Area is the city of West Haven. The aerial photographs below provide a comparison of growth between 1993 and 2006. In 1993, West Haven was a very small community yet to experience growth. By 2006, West Haven had grown remarkably through residential and commercial development. West Haven is only one example of the rapid growth that will be experienced in the Study Area in the coming years.

Figure 5: Photos of growth in West Haven between 1993 and 2006

Employment

Population and Employment are closely linked socio-economic factors.

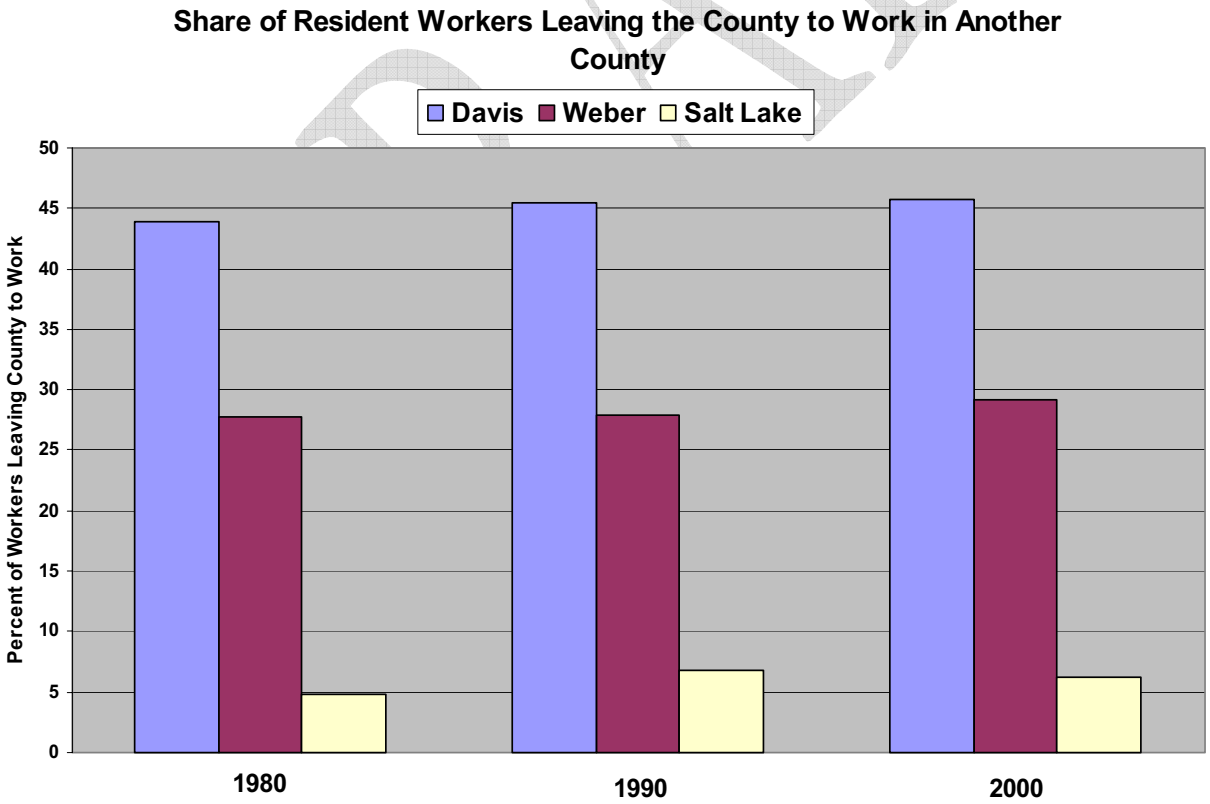
Figure 6: Employment Growth 2007 and 2040, by east and west portions of the Study Area



A review of Figure 6 shows that both north Davis and Weber counties experience job growth from 2007 through planning year 2040. Weber County's experiences stronger job growth than Davis County over the same period of time. This rapid increase in Weber County could be due to several large employment centers that might expand such as the Department of the Treasury – Internal Revenue Service; Weber County School District; Intermountain Health Care's McKay-Dee Hospital Center; and, Weber State University. What is noteworthy is the significant job growth that occurs on the east side of I-15. Currently, there is a pattern of more population on the west side of I-15 than jobs and this pattern continues to planning year 2040.

The growth of both population and employment in the Study Area will have significant impact on both the local and regional transportation network. The historical commuting patterns of the residents in Davis and Weber Counties show that nearly 50 percent of Davis residents and over 25 percent of Weber residents travel to work outside of their county of residence as indicated in Figure 7. Salt Lake County residents, on the other hand, do not generally leave Salt Lake County for employment.

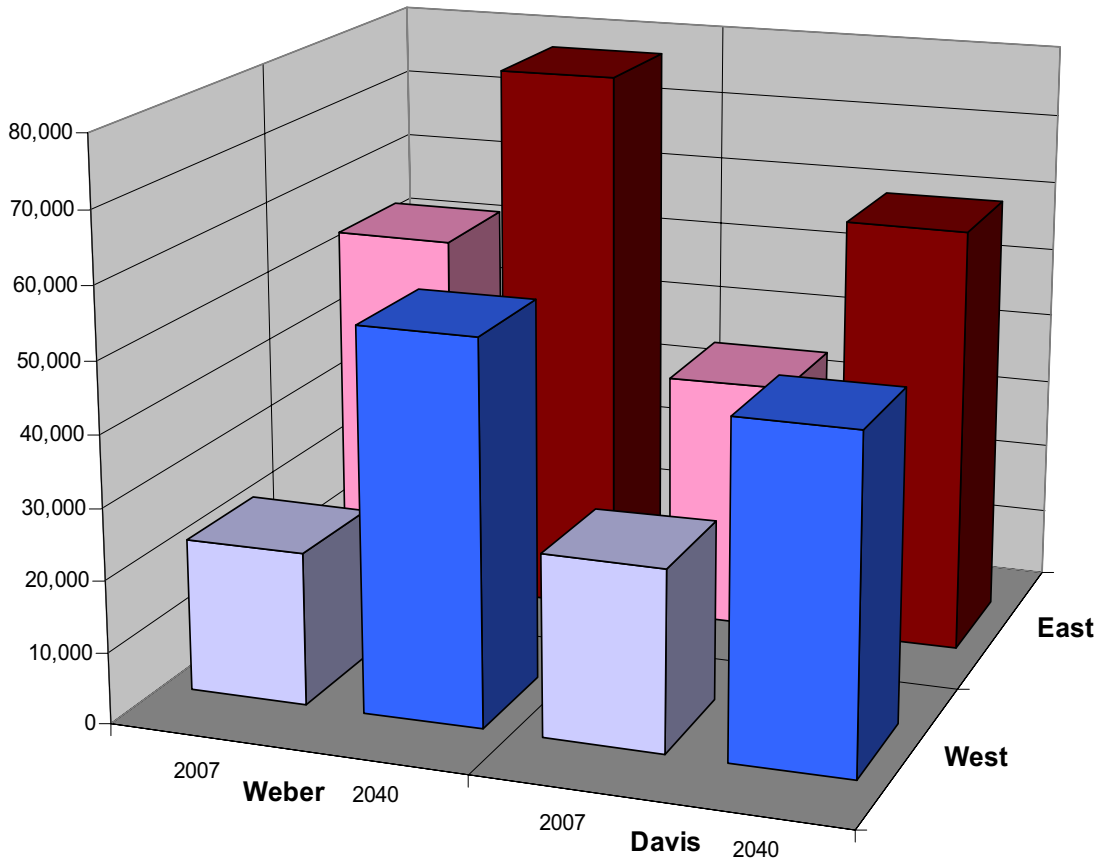
Figure 7: Historical resident workers leaving Davis or Weber counties to work in another county



Dwelling Units

The WFRC travel demand model dwelling unit figure differs from the jurisdictions' calculations for 2007 and 2040. Based upon the discussions with individual jurisdictions conducted by InterPlan staff members, the travel demand model individual dwelling unit numbers were adjusted for each TAZ.

Figure 8: WFRC Versus Jurisdiction Estimated Number of Dwelling Units



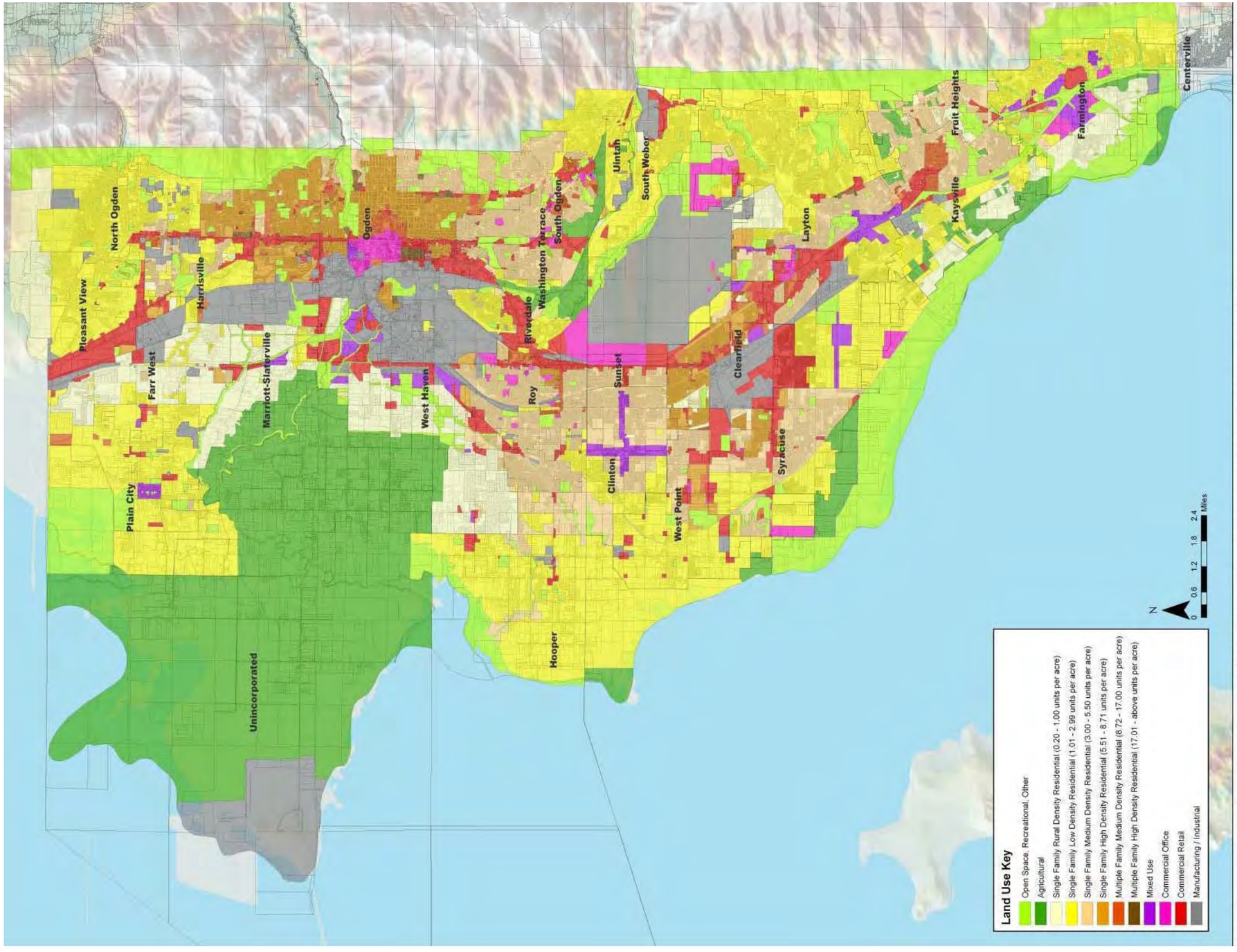
The growth in dwelling units in the Weber and Davis areas increases markedly between 2007 and 2040 especially on the west side of the Study Area. Figure 8 shows the growth in dwelling units for the complete Study Area divided geographically by the east and west side. It is clear that there is strong growth in the number of dwelling units through planning year 2040 that will have an impact on the planning of a transportation network.

Land Use

The historical land use development has been from east to west and south to north. Future development patterns within the Study Area are not expected to change dramatically in coming years. Employment numbers indicate that while most cities do anticipate adding commercial land uses in coming decades, and thereby increase employment opportunities, there will continue to be more residents than jobs. As with existing land uses, residential development will continue to be primarily single-family and suburban in nature causing most workers that live in the area to seek employment elsewhere.

Figure 9 shows the residential versus commercial and industrial land uses in the Study Area. It is apparent that while there are areas of employment and commercial activity in the Study Area, the majority of development is low density residential land use. However, the land use may change in the future. Ogden plans high density development for its downtown core. Additionally, the mixed use development pattern is becoming a popular option for new development in the Study Area. For example, a large mixed used development is planned that will require cooperation and collaboration between the cities of Syracuse, Clearfield and West Point.

Figure 9: 2007 Land Use in the Study Area



Chapter 5
Existing Studies: WFRC Regional Transportation Plan

The DWEWTS is not the first time transportation issues have been addressed in the Study Area. It is important that this study builds on past analyses. This chapter introduces the existing highway and transit studies recently, or currently being, completed in the Study Area.

As stated in a previous chapter, the WFRC is responsible for the regional and state level transportation planning in the urbanized areas of Salt Lake, Davis and Weber Counties. Once every four years, the WFRC, in collaboration with UDOT and the Utah Transit Authority (UTA), along with other interested stakeholders, is mandated by the federal government to produce a regional transportation plan. The Wasatch Front Regional Transportation Plan 2007-2030, or more commonly known as the Wasatch Front 2030 RTP, was last adopted on May 24, 2007. All highway and transit projects anticipated in the next 23 years in Davis and Weber Counties are included in the WFRC's 2030 RTP.

The growth in the region impacts transportation at a regional level.

Transportation Studies

In the past, many of the larger studies have focused much more on north-south transportation issues; recent studies identified in the Study Area being reviewed as part of this study include the following:

- US-89 I-15/Farmington to Harrison Boulevard/South Ogden Davis and Weber Counties, Utah Final Environmental Impact Statement (1996)
- North Legacy Transportation Corridor Study (2001)
- Inter-Regional Corridor Alternatives Analysis (2002)
- Weber County to Salt Lake Commuter Rail Environmental Impact Statement (2005)
- I-15 Corridor Plan – Kaysville to Ogden (2005)
- State Road 108 Environmental Impact Statement (in process)
- North Legacy Supplemental Corridor Study (in process)
- South Davis Transit Study (in process)

By comparison, recent east-west studies include:

- 200/700 Corridor Preservation Study (2000)
- SR-79; Hinckley Drive Extension to SR-108, Ogden Environmental Assessment (2002)
- Syracuse Road 1000 West to 2000 West Environmental Impact Statement (2007)
- Layton Interchange Environmental Impact Statement (in process)
- North Legacy Connector (in process)

Other studies, past and in process, that examine both east-west and north-south transportation corridors:

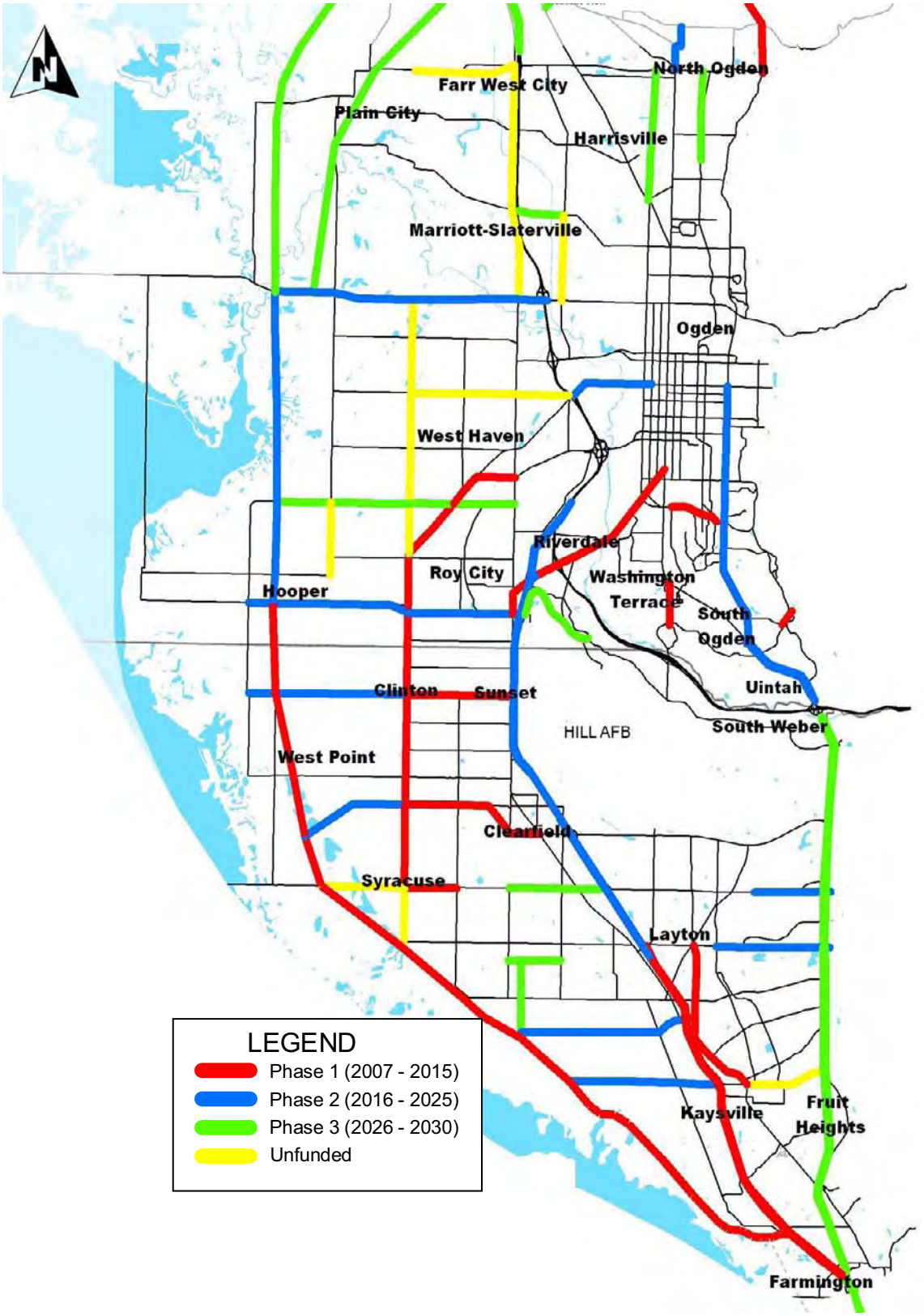
- West Central Weber County General Plan (2003)
- Ogden/Weber State Transit Corridor Study (2005)
- North Weber County Corridor Preservation Study (2005)
- Weber State University Master Transportation Plan (2006)
- West Point City Transportation Master Plan (2007)
- SR-26 Riverdale Road from 1900 West to Washington Boulevard Environmental Impact Statement (2007)

The Consultant Team reviewed all existing studies, both north-south and east-west, as part of the study process so as to provide an all encompassing approach to east-west transportation issues.

Wasatch Front 2030 RTP

The Wasatch Front 2030 RTP is a starting point from which the DWEWTS proceeds. Through specialized study and analysis, the Consultant Team examined the capacity of the east-west roads in the Study Area as well as reviewing other existing studies to estimate the timing of the proposed transportation improvement projects. The following map represents the Wasatch Front 2030 RTP Highway Projects in the Study Area.

Figure 10: RTP Highway Projects by Phase



Chapter 6
Initial Needs Assessment and Future Deficiencies

Overall, solid steady growth in the Study Area will create challenges for the existing transportation network. Not only will there need to be changes in the way individuals travel, but transportation facilities will need to be constructed as well as expanded in order to accommodate the burgeoning population. The above analysis on the socio-economic data in the Study Area provides a base upon which to evaluate proposed transportation networks that accommodate the requirements of HB 108 (2007).

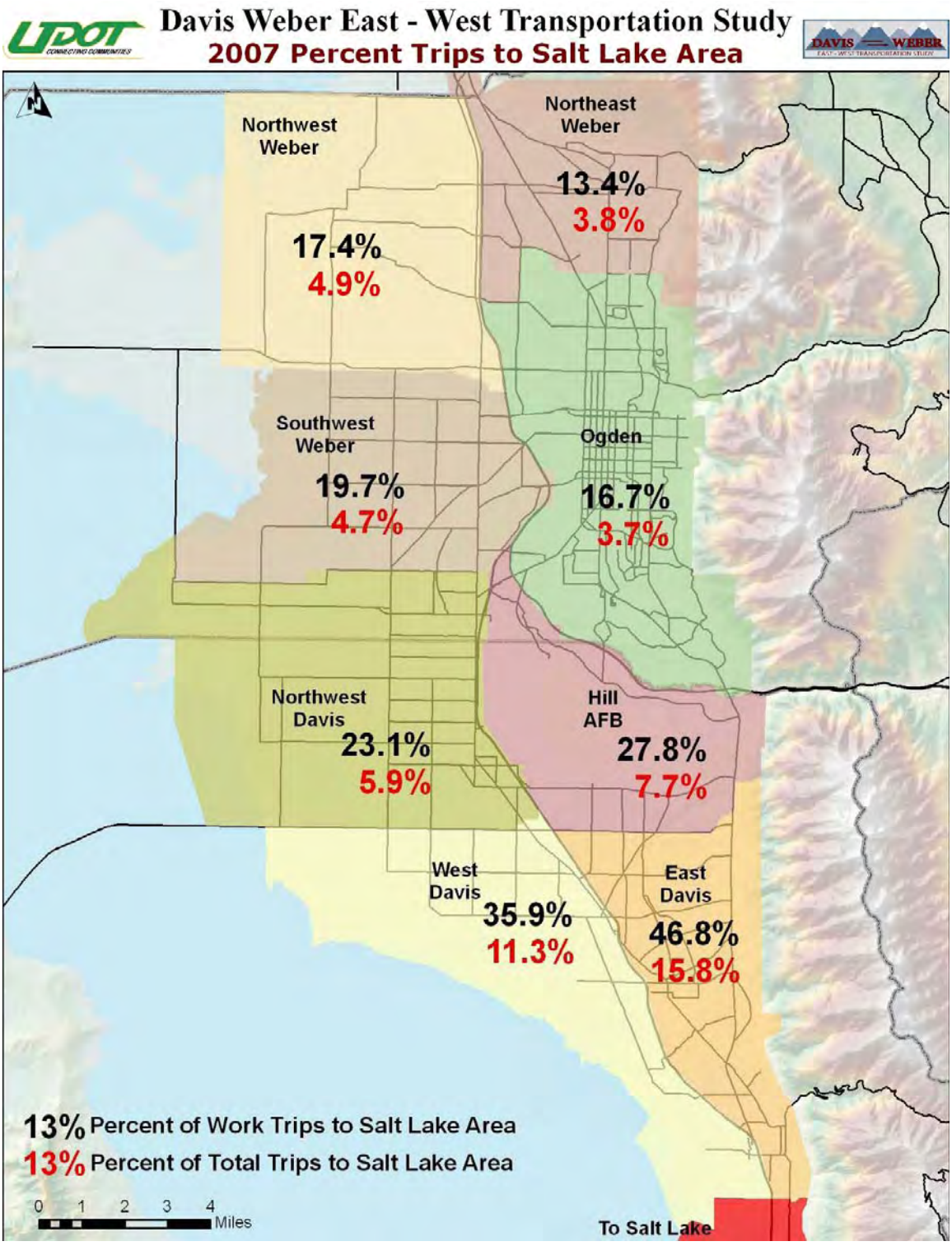
Travel Patterns

The activities that motivate an individual to travel from one place to another are at the base of understanding travel patterns. For example, traveling to work or to the grocery store creates individual movements that collectively become travel patterns when the many individual movements are grouped together. This section provides analysis on the travel patterns that are made by all trips as well as work trips made by individuals in the Study Area. For analysis purposes, the Study Area has been divided into eight travel districts or areas: Northwest, Northeast and Southwest Weber county, Ogden, Northwest, West and

The transportation system must meet various types of needs.

East Davis county and Hill Air Force Base. Figure 11 shows the percent of work trips and total trips to the Salt Lake area from the Study Area in 2007.

Figure 11: 2007 Percent Trips to Salt Lake Area



Work Trips

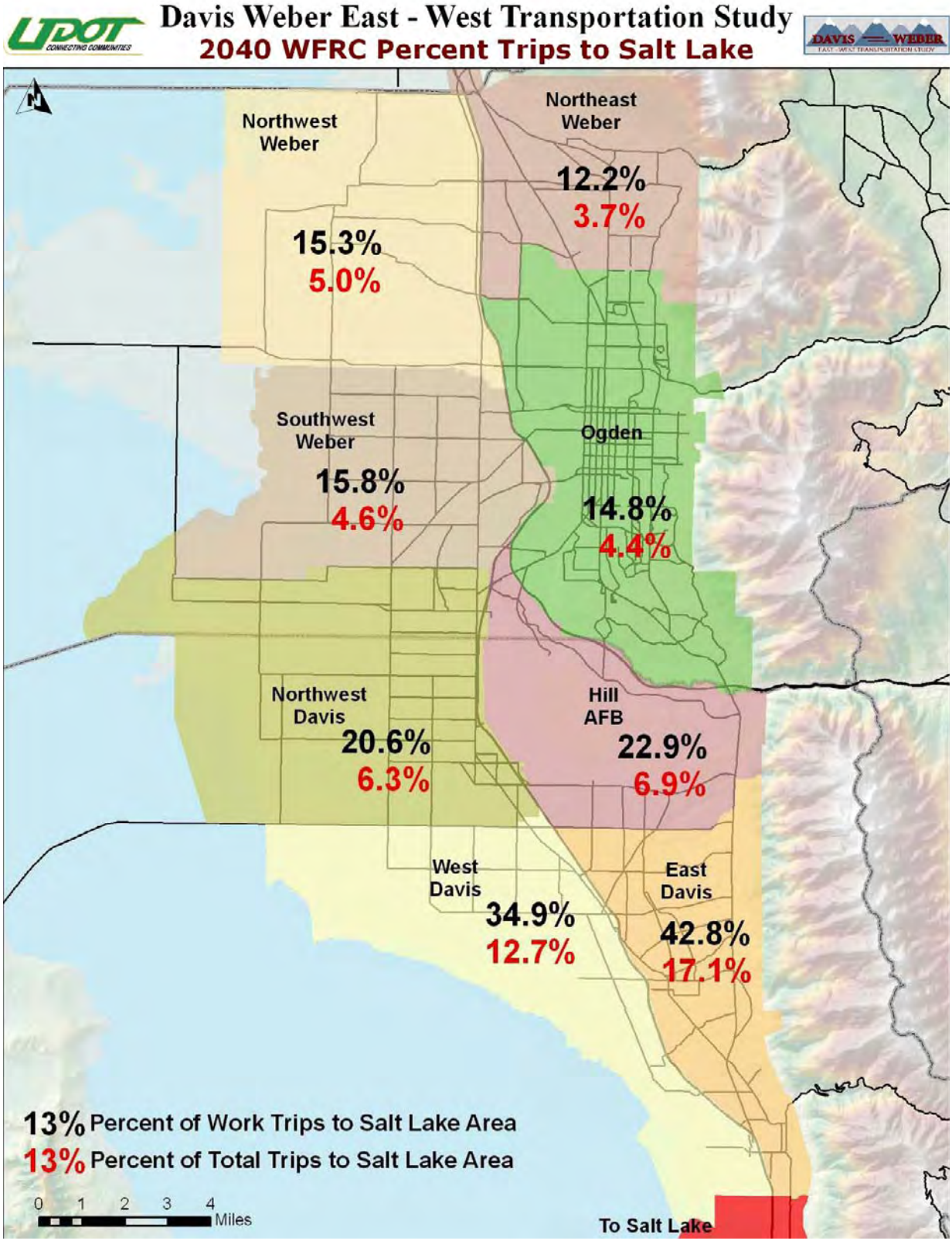
Figures 11 and 12 show that in 2040 the percentage of work trips to the Salt Lake area decreases slightly for all travel districts. For example, in 2007 47 percent of the work trips go to Salt Lake, but in 2040 it decreases to 43 percent of the work trips go to Salt Lake. Over time, more jobs are anticipated to become available in the Study Area so that individuals are able to work closer to where they live.

Total Trips

The percent of total trips to the Salt Lake area in 2040 increases or stays the same in all travel districts except for Hill Air Force Base. The most dramatic increase in percentage of total trips to the Salt Lake area occurs in East Davis County travel district. In 2007, 16 percent of the total trips go to Salt Lake and in 2040 the percent of all trips to Salt Lake increases to 17 percent. There is relatively little change in the percent of trips to Salt Lake in the Northeast, Northwest and Southwest Weber travel districts. The decrease in percent of total trips to Salt Lake from Hill Air Force Base travel district might be explained by plans for future employment growth on Hill Air Force Base.

Vehicles making the trip south on I-15 in Davis County (July 2008).

Figure 12: 2040 Percent Trips to Salt Lake Area



Congestion Measurements

One of the first steps in analyzing future deficiencies was to determine whether or not future transportation problems should be expected based on available information. Care was taken in choosing the measures used so that they would be an effective means of relaying relatively technical information to a wide range of audiences. For example, the performance measures should be able to be graphically represented so that they would be quickly and easily understood and compared.

The measurement tools used by the Consultant Team include:

- Travel Time Index (TTI) – refers to a measure of congestion determined by dividing the time it takes to travel a given road segment at the peak hour, by the free-flow travel time for that segment. A TTI of 1.00 indicates that there is no difference in travel time on a given road during the peak hour or during free-flow travel time. A TTI greater than 1.00 is representative of peak hour trips taking longer than non-congested travel.

- Level of Service (LOS) – standard measurement used to identify the amount of congestion on a given roadway. Level of service is given grades of A through F, with A being free-flow conditions and F being highly congested, "parking lot" conditions. A surrogate for detailed LOS analysis is a Volume to Capacity ratio (V/C). A V/C of less than 0.75 equates to LOS C while V/C ratios between 0.76 and 1.0 are approximately LOS D.

- Vehicle Hours of Travel (VHT) – a calculation of the total time all vehicles spend on the transportation network in an average day. This measure is obtained from the regional travel demand model and helps to identify area-wide congestion changes.

Travel Time Index (TTI)

As indicated in Figure 13, the 2007 TTI for the Study Area is 1.19. This means that a trip made during free flow conditions that takes 15 minutes will be an 18 minute trip during peak travel times. In 2040, assuming only the committed projects; the TTI will increase to 2.34. This means that a 15 minute trip during free flow time will take approximately 35 minutes during a peak travel time. For our Study Area, the 2040 WFRC TTI, which assumes all projects in the WFRC RTP are completed, is 1.49 or approximately 22 minutes.

In order to generate Figure 14, the Study Area was divided into four areas: West Weber, East Weber, West Davis and East Davis. Figure 14 shows the TTI on the existing 2007 transportation network and the 2040 socio-economic data with the TIP and WFRC RTP transportation network. Completing only the committed projects significantly increases the TTI; completing all the WFRC RTP projects is better than the committed projects, but the TTI still worsens compared to today's transportation network.

Figure 13: 2007 Existing, 2040 Committed, and 2040 WFRC RTP Travel Time Index (TTI) for Study Area

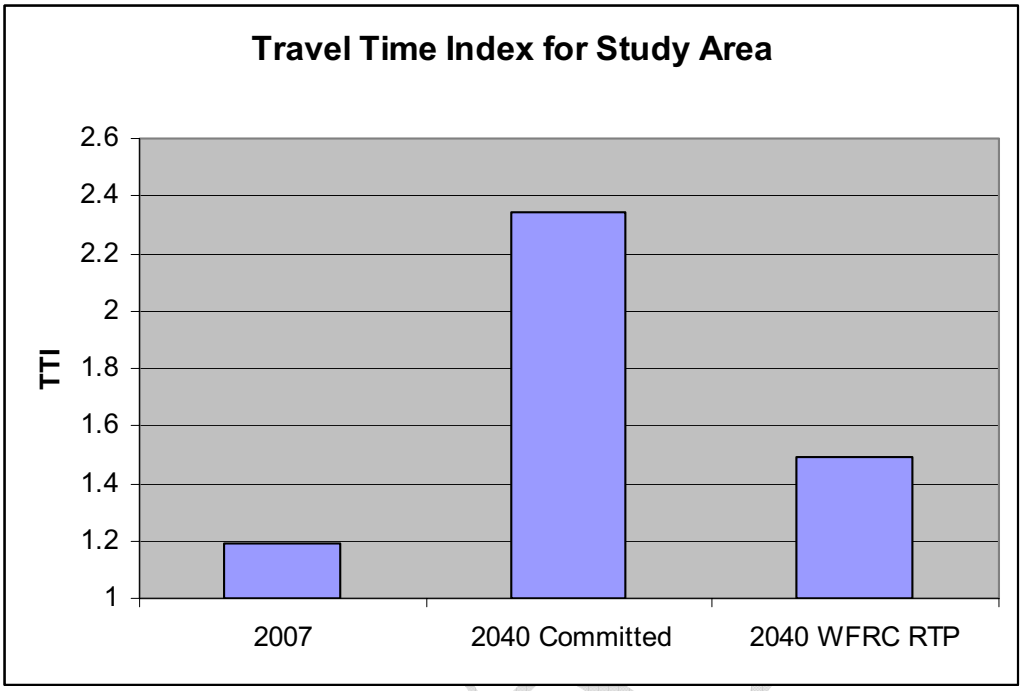
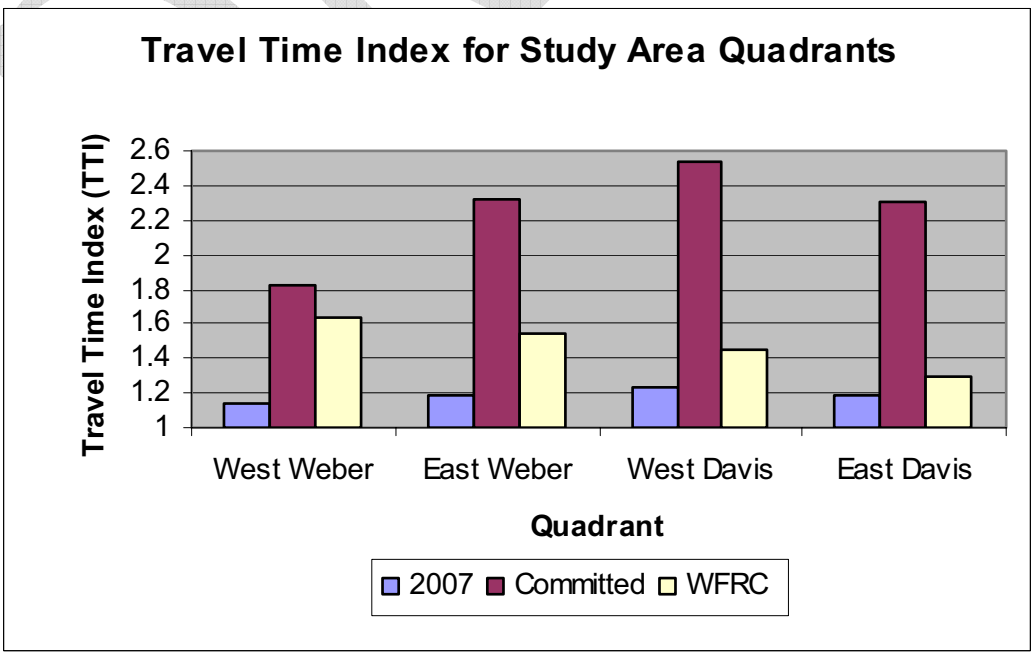


Figure 14: Travel Time Indexes (TTI) for Study Area Quadrants for 2007 Existing, Committed Projects, Wasatch Front Regional Council Regional Council's Regional Transportation Plan (RTP)



Level of Service (LOS)

One way to anticipate problems is to look at level of service. Level of Service (LOS) is a measure of traffic congestion. Specifically, it is a traffic engineering term often used to measure and describe the amount of travel delay on a roadway network and/or at an intersection. Since traffic and overall travel is usually most congested during the morning and afternoon peak travel periods, it is advantageous to try to relieve congestion for these periods. Lessening congestion in peak periods would solve almost all travel problems for most conditions throughout the day. Typically, LOS C or D service flow rates are used in analysis in order to ensure acceptable traffic operations. LOS C and D are targeted because designing to a better LOS may require too much right-of-way and too many expenses for little benefit, while a worse LOS would increase congestion in more than just the peak periods.

Figure 15 illustrates the LOS definitions for suburban arterials as defined by the Transportation Research Board in the Highway Capacity Manual (HCM) 2000.

Figure 15: Undivided Multilane Suburban Highway/Arterial Level of Service

Level of Service (LOS)	Traffic Conditions
A	Free-flow operations at average travel speeds, vehicles are unimpeded in maneuvering within traffic stream
B	Relatively unimpeded at average travel speeds, only slightly restricted maneuvering within traffic stream
C	Relatively stable traffic operations, more restricted maneuvering at mid-block locations than LOS B, individual cycle failures at traffic signals may begin to appear
D	Small increases in traffic flow may cause substantial delay and decrease in travel speed, congestion and individual cycle failures at traffic signals are more noticeable as vehicles stop
E	Poor travel speeds with slow progression and high delay, individual cycle failures at traffic signals occur frequently
F	Extremely slow travel speeds with queues forming behind breakdowns, brief periods of movement are followed by stoppages, considered unacceptable by most drivers

(Source: Highway Capacity Manual (HCM) 2000, Transportation Research Board National Research Council, Washington D.C., 2000.)

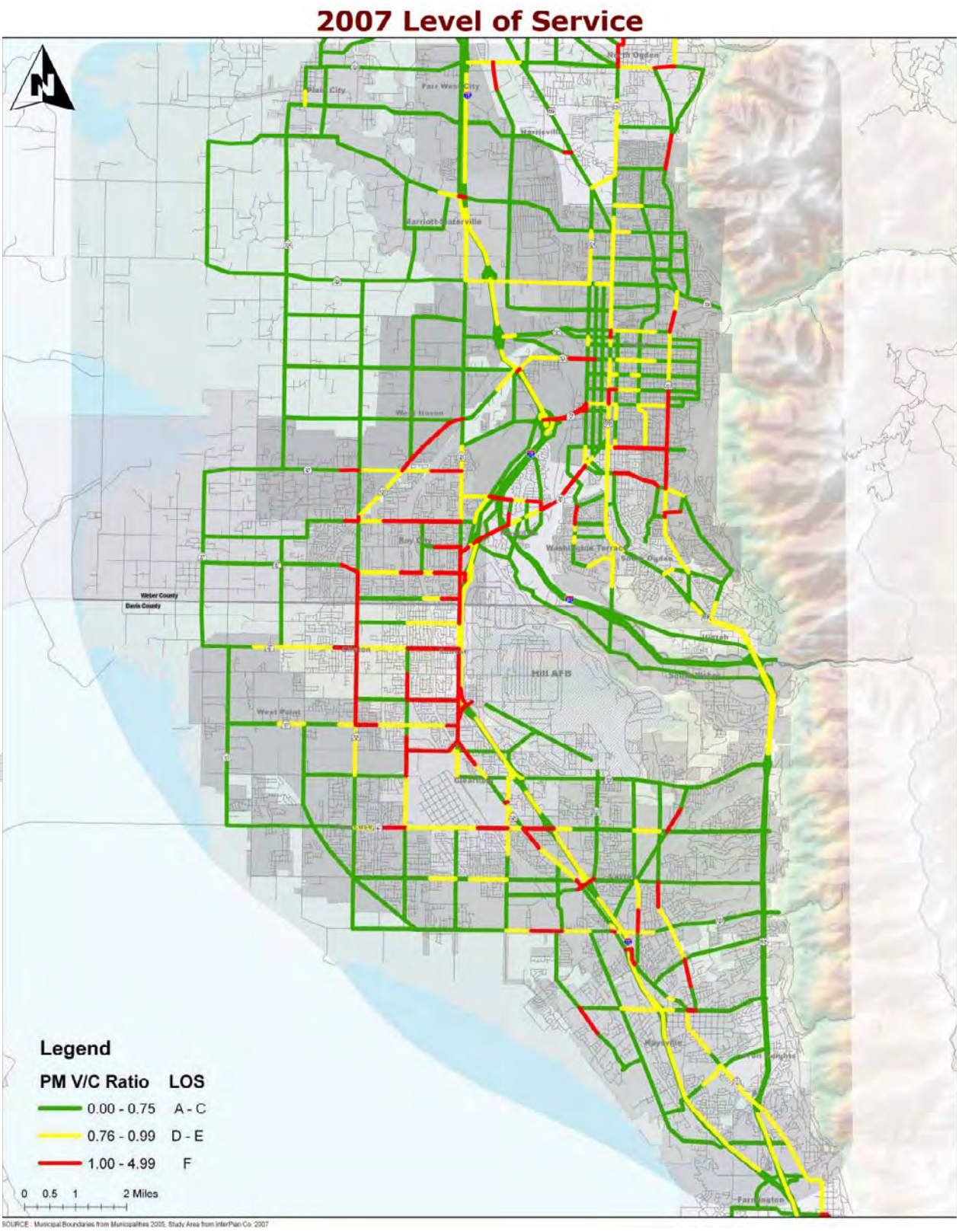
The LOS in the Study Area was evaluated through travel demand modeling and/or forecasting traffic flows on the current transportation system for existing conditions in year 2007 and projected for the planning horizon year 2040. Figure 17 shows the LOS for existing conditions in year 2007.

Results of travel modeling are expressed in volume to capacity ratios, a surrogate for the more detailed LOS analysis. Actual LOS calculations would require extensive data collection and detailed information related to intersection geometry. The travel model uses average conditions which are not sensitive to each individual intersection but are generalized to the type of road. Travel model forecasts of LOS using volume to capacity

ratios are typically acceptable for master planning since it allows streets to be properly sized but continues to put the burden on individual developments to perform traffic studies which analyze the more micro conditions. Volume to capacity ratios above 1.00 would result in peak period congestion possibly worse than LOS D. A ratio greater than 1.00 could result in signal failure and extended periods of congestion on the roadway.

Figure 16: Illustration of Levels of Service

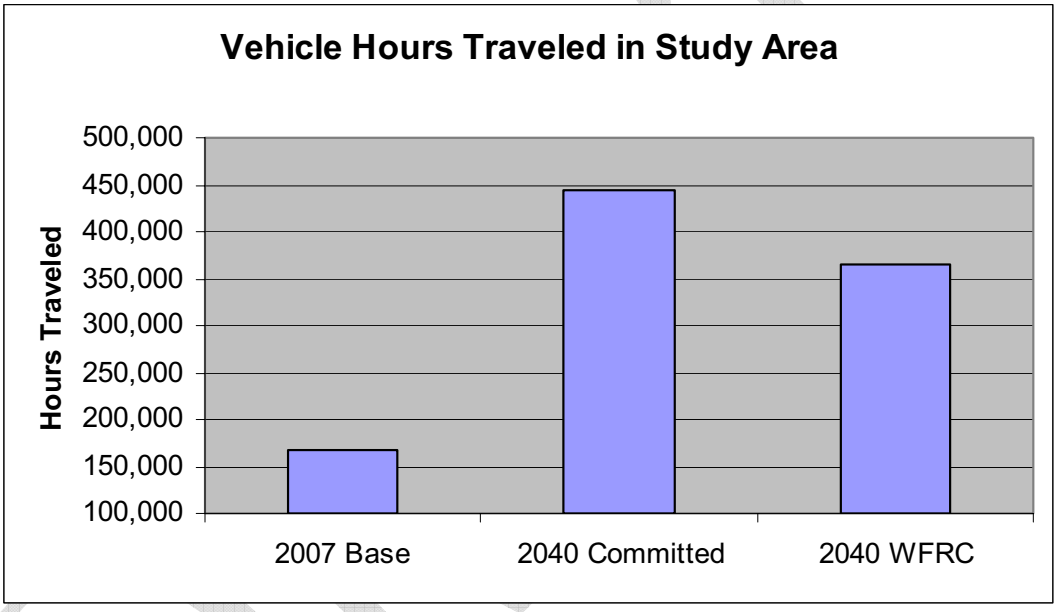
Figure 17: Roadway Level of Service, PM Peak



Vehicle Hours Traveled (VHT)

In 2007, the daily total vehicle hours expended traveling on the roadway network in the Study Area was 168,354 hours. Assuming the completion of committed projects, the total number of vehicle hours increases to 443,000 hours. When modeling the 2040 WFRC VHT, which assumes all projects in the WFRC RTP are completed, is 364,000 hours. As a result of the population increase between 2007 and planning year 2040, there is an increase in the number of vehicles on the roadway. This increased automobile traffic increases congestion which is measured by vehicle hours traveled.

Figure 18: Vehicle Hours Traveled (VHT) for Study Area 2007 Existing, 2040 Committed, 2040 WFRC Regional Transportation Plan



Summary

Now that a baseline of socio-economic information and travel measurement tools have been established for the Study Area for 2007 and for planning year 2040, the next step taken by the Consultant Team was to develop and evaluate transportation network alternatives.